



Indicator Expansion with Analysis Pipeline

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Definition

“Indicator expansion is a process of using one or more data sources to obtain more indicators of malicious activity by identifying those related to currently known indicators.”

~ Some guy named: Jono Spring 2013

Generic Situation

1. Our host communicates with known bad IP address
2. Host gets infected
3. Host communicates with a different IP for:
 - Command and control
 - Exfiltration

Let's try and find these second-level IP addresses

- They're bad

What we need to do

1. Detect our host communication with black list IP
2. Keep a list of these hosts
3. Track the IPs where these hosts send traffic
4. Count how many hosts contact each IP
5. Alert if some number of hosts contact an IP
6. Record those IPs in alerts and/or IPSets

Disclaimer

This algorithm is generic

Threshold values in the example are just examples,
they are not to be used

This is not being run anywhere

Illuminates a way Analysis Pipeline can implement
existing analysis ideas

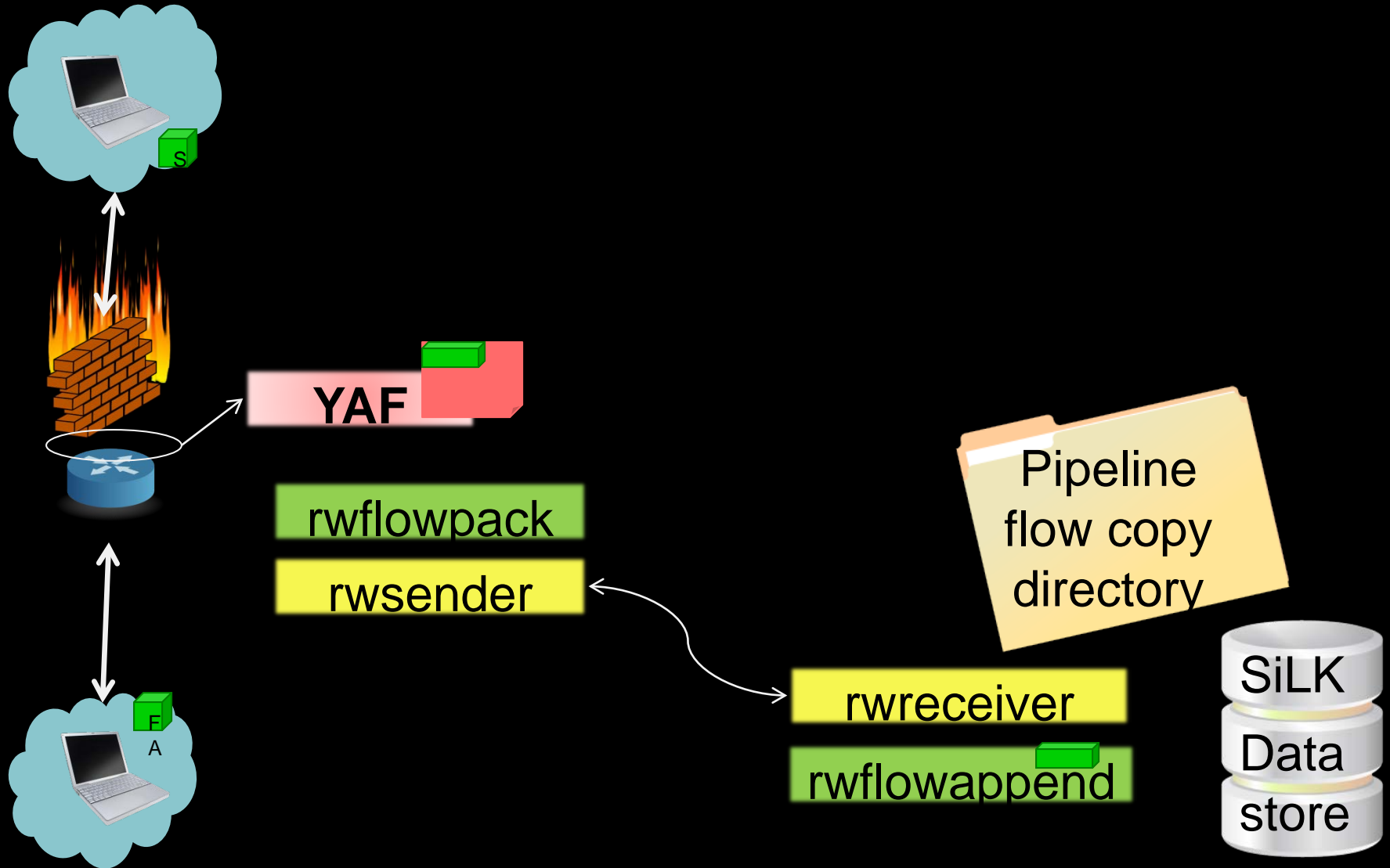
Needs / Decisions

- Need: Accepted malicious IP list
 - SiLK IPSet: badIPs.set will contain these IPs
- Need: White list of IPs where our hosts often communicate with
 - SiLK IPSet: safePopularIPs.set will contain these Ips
- Decision: Track our hosts for 1 day
- Decision: Use 50 hosts contacting second level IP as the threshold, within a 36 hour time window
- Decision: Dump list of second level IPs in both an alert and IPSet file every 6 hours

Analysis Pipeline overview

- Version 4.4.1 publicly released:
 - tools.netsa.cert.org/analysis-pipeline
- Streaming analysis of SiLK records
- Filters
- Internal Filters – “scratch paper”
- Evaluations / Statistics
 - Can bin state based on value of specified field
- Configuration file tells Pipeline what to do
 - Simple config files accomplishes our entire scenerio

Mechanics of Flow Collection



Steps 1 & 2 – Detect and Track

FILTER badTraffic

DIP IN LIST “badIPs.set”

END FILTER

INTERNAL FILTER trackInfectedHosts

FILTER badTraffic

SIP infectedHosts 1 DAY

END INTERNAL FILTER

Step 3 watch where infected hosts go

FILTER nonWhiteListPostInfected

SIP IN LIST infectedHosts

DIP NOT IN LIST safePopularIPs.set

END FILTER

Step 4 & 5: Count Hosts Per IP and Alert

```
EVALUATION secondLevelPopularIPs
  FILTER nonWhiteListPostInfected
  FOREACH DIP
    OUTPUT TIMEOUT 1 DAY
    OUTPUT LIST DIP secondLevelIPs
    <alerting options...not discussed>
    CHECK THRESHOLD
      DISTINCT SIP > 50
      TIME WINDOW 36 HOURS
    END CHECK
  END EVALUATION
```

Step 6: Report Expanded Indicators

```
LIST CONFIGURATION secondLevelIPs  
    UPDATE 6 HOURS  
    SEED "latestSecondLevelIPs.set"  
    OVERWRITE ON UPDATE  
END LIST CONFIGURATION
```

Full Configuration – not so hard

FILTER badTraffic

 DIP IN LIST “badIPs.set”

END FILTER

INTERNAL FILTER trackInfectedHosts

 FILTER badTraffic

 SIP infectedHosts 1 DAY

END INTERNAL FILTER

FILTER nonWhiteListPostInfected

 SIP IN LIST infectedHosts

 DIP NOT IN LIST

safePopularIPs.set

END FILTER

EVALUATION secondLevelPopularIPs

 FILTER nonWhiteListPostInfected

 FOREACH DIP

 OUTPUT TIMEOUT 1 DAY

 OUTPUT LIST DIP secondLevelIPs

 <alerting options...not discussed>

 CHECK THRESHOLD

 DISTINCT SIP > 50

 TIME WINDOW 36 HOURS

 END CHECK

END EVALUATION

LIST CONFIGURATION secondLevelIPs

 UPDATE 6 HOURS

 SEED “latestSecondLevelIPs.set”

 OVERWRITE ON UPDATE

END LIST CONFIGURATION



Questions/comments?

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